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SERIES G: TRANSMISSION SYSTEMS AND MEDIA,
DIGITAL SYSTEMS AND NETWORKS

Digital sections and digital line system – Optical fibre
submarine cable systems

Characteristics of optical fibre submarine cables

Recommendation ITU-T G.978



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Recommendation ITU-T G.978

Characteristics of optical fibre submarine cables

Summary

Recommendation ITU-T G.978 deals with the characteristics of the optical fibre submarine cables used in Recommendations ITU-T G.973, ITU-T G.973.1, ITU-T G.974 and ITU-T G.977. It covers transmission characteristics of optical fibre submarine cables, optical fibres used in submarine cables, including mechanical characteristics and resistance to the environment and other electrical characteristics. It also covers the transmission characteristics of the single- and hybrid-fibre type elementary cable sections. Any specific information regarding the characteristics of optical fibre submarine cables are included in the relevant optical submarine system's Recommendations.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T G.978	2006-12-14	15
2.0	ITU-T G.978	2010-07-29	15

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

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Recommendation ITU-T G.978

Characteristics of optical fibre submarine cables

1 Scope

This Recommendation deals with the characteristics of the optical fibre submarine cables used in [ITU-T G.973], [ITU-T G.973.1], [ITU-T G.974] and [ITU-T G.977].

An optical submarine cable can be used in:

- a repeatered optical submarine system;
- a repeaterless optical submarine system.

This Recommendation specifies the characteristics of the submarine cables which can be used in the deep and shallow waters.

This Recommendation covers:

- transmission characteristics of optical fibres in submarine cables including mechanical characteristics and resistance to the environment;
- characteristics of optical fibre submarine cables including mechanical characteristics and resistance to the environment and other electrical characteristics;
- transmission characteristics of single- and hybrid-fibre type elementary cable sections.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T G.650.1] Recommendation ITU-T G.650.1 (2004), *Definitions and test methods for linear, deterministic attributes of single-mode fibre and cable.*
- [ITU-T G.650.2] Recommendation ITU-T G.650.2 (2007), *Definitions and test methods for statistical and non-linear related attributes of single-mode fibre and cable.*
- [ITU-T G.652] Recommendation ITU-T G.652 (2009), *Characteristics of a single-mode optical fibre and cable.*
- [ITU-T G.653] Recommendation ITU-T G.653 (2006), *Characteristics of a dispersion-shifted single-mode optical fibre and cable.*
- [ITU-T G.654] Recommendation ITU-T G.654 (2006), *Characteristics of a cut-off shifted single-mode optical fibre and cable.*
- [ITU-T G.655] Recommendation ITU-T G.655 (2009), *Characteristics of a non-zero dispersion-shifted single-mode optical fibre and cable.*
- [ITU-T G.656] Recommendation ITU-T G.656 (2006), *Characteristics of a fibre and cable with non-zero dispersion for wideband optical transport.*
- [ITU-T G.667] Recommendation ITU-T G.667 (2006), *Characteristics of adaptive chromatic dispersion compensators.*

- [ITU-T G.671] Recommendation ITU-T G.671 (2009), *Transmission characteristics of optical components and subsystems*.
- [ITU-T G.972] Recommendation ITU-T G.972 (2008), *Definition of terms relevant to optical fibre submarine cable systems*.
- [ITU-T G.973] Recommendation ITU-T G.973 (2007), *Characteristics of repeaterless optical fibre submarine cable systems*.
- [ITU-T G.973.1] Recommendation ITU-T G.973.1 (2009), *Longitudinally compatible DWDM applications for repeaterless optical fibre submarine cable systems*.
- [ITU-T G.974] Recommendation ITU-T G.974 (2007), *Characteristics of regenerative optical fibre submarine cable systems*.
- [ITU-T G.976] Recommendation ITU-T G.976 (2010), *Test methods applicable to optical fibre submarine cable systems*.
- [ITU-T G.977] Recommendation ITU-T G.977 (2006), *Characteristics of optically amplified optical fibre submarine cable systems*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

- 3.1.1 submarine portion:** See [ITU-T G.972] (1005).
- 3.1.2 optical submarine repeater:** See [ITU-T G.972] (1020).
- 3.1.3 cable breaking load:** See [ITU-T G.972] (5007).
- 3.1.4 double armoured cable:** See [ITU-T G.972] (5004).
- 3.1.5 fibre-breaking cable load:** See [ITU-T G.972] (5008).
- 3.1.6 minimum cable bending radius:** See [ITU-T G.972] (5032).
- 3.1.7 nominal operating tensile strength:** See [ITU-T G.972] (5010).
- 3.1.8 nominal permanent tensile strength:** See [ITU-T G.972] (5009).
- 3.1.9 nominal transient tensile strength:** See [ITU-T G.972] (5011).
- 3.1.10 rock armoured cable:** See [ITU-T G.972] (5005).
- 3.1.11 single armoured cable:** See [ITU-T G.972] (5003).
- 3.1.12 relative dispersion slope:** See [b-ITU-T G-Sup.40].
- 3.1.13 terminal transmission equipment:** See [ITU-T G.972] (1010).
- 3.1.14 optical fibre submarine cable:** The submarine cable using optical fibres as transmission line. (1019 in [ITU-T G.972]).

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

- 3.2.1 elementary cable section:** The whole length of optical fibre cable between two pieces of equipment (repeaters, branching units or terminal transmission equipment). (1028 in [ITU-T G.972]). In this Recommendation, two types of elementary cable section are described:
 - single-fibre type elementary cable section;
 - hybrid-fibre type elementary cable section.